ICELAND

General

Iceland, the national name of which is Island, lies between 62˚23'N and 66˚33'N, and 13˚28'W and 24˚32'W. The shortest distance between its coast and that of East Greenland is about 150 miles, Norway 550 miles, and the Faeroes 250 miles. The total area of Iceland is about 39,758 square miles. Iceland is the most sparsely inhabited country in Europe, and over 60 percent is uninhabited and likely to remain so, as it contains a large area of ice, lava, and sand. The country lies just S of the Arctic circle, and in the most N districts the sun is visible above the horizon all day for about 2.5 weeks in the month of June.

The limits of this section include Iceland, Jan Mayen, Svalbard, the E coast of Greenland, the Greenland Sea, and parts of the Norwegian Sea and the North Atlantic Ocean.

Buoyage System

The IALA Buoyage System (Region A) is in effect within Icelandic waters. See Chart No. 1 for further IALA Buoyage System information.

Waverider lighted buoys (special/spherical) may be encountered within the vicinity of Iceland, Greenland, and Svalbard and should be given a wide berth.

Beacons indicating danger areas or other closed areas carry topmarks painted black and yellow in bands; front, triangle point up, rear triangle point down.

Beacons indicating submarine pipelines carry yellow diamond topmarks, front and rear.

Range and anchorage beacons carry triangular topmarks, point up on the front, point down on the rear; they also may exhibit lights and be fitted with light reflectors.

Submarine cables are indicated by beacons standing close to the positions at which they are landed, and indicating the direction in which they are laid. The posts are painted with red and white bands; the rear topmark is a red disc with a white border above a white diamond with a red border, and the front topmark is a red disc with a white border. When in line, the topmarks appear as a white diamond between two red discs, disposed vertically.

Currency

The official unit of currency is the krona, consisting of 100 aurar.

Currents

The general surface water circulation are the predominant currents of the area throughout the year. However, currents are bound to vary significantly in direction and rate, since they are dependent on oceanographic and meteorological factors with variables. In addition, currents flowing close into the fjords and other fresh water outlets will considerably strengthen run-offs during the summer months, and the rates may exceed 3 knots.

The flow of water is mainly determined by two major currents. The Norwegian Atlantic Current sets NNE off the coast of Norway; in about 70˚N it divides into the West Spitsbergen Current and the North Cape Current. The East Greenland Current, the major outlet for cold water from the Arctic basin, sets in a generally SW direction along the coast of East Greenland with constancy.

North of 80˚N

The flow of water in this area is directed towards the SW, outwards from the Arctic basin. It constitutes the downstream extremity of the wide Transpolar Drift, which commences in East Siberian Sea and mainly emerges from the Arctic through the broad channel between Greenland and Svalbard, where it becomes the East Greenland Current.

Two other minor outlets for Arctic water are the East Spitsbergen Current, which sets SSW on the E side of Svalbard, and the Bear Island Current.

South of 80˚N and E of 5˚E

The West Spitsbergen Current, the W branch of the Norwegian Atlantic Current, sets NNW off Svalbard and at about 80˚N it submerges beneath the ice-bearing Arctic water because of its higher salinity. The Spitsbergen Current is the main supplier of warm water into the Arctic basin.

The North Cape Current, the E branch of the Norwegian Atlantic Current, sets E into the Barents Sea.

The Bear Island Current emerges from the Arctic basin through the channel between Zemlya Frantsa Iosifa and Severnaya Zemlya. The main part merges with the remainder of the East Spitsbergen Current, and then converges with a branch of the North Cape Current to form an eddy in the W part of the Barents Sea.

The remainder of Bthe ear Island Current converges with another branch of the North Cape Current to form an eddy in the E part of the Barents Sea.

The rates of the currents in this area are mostly low, probably less than 0.5 knot, but close to the coasts of Svalbard the current may sometimes run up to 2 knots.

South of 80˚N and between 5˚E and 20˚W

The Jan Mayen Current leaves the East Greenland Current at about 76˚N,and converges with a recurved branch of the West Spitsbergen Current to form a large permanent eddy centered at about 76˚N on the prime meridian.

The East Iceland Current leaves the East Greenland Current at about 71˚N, and mixes with the Irminger Current off Langanes. Branches from the E flank of the East Iceland Current, together with branches from the W flank of the Norwegian Atlantic Current, form a series of semi-permanent eddies on the meridian of 5˚W.

The Irminger Current is a warm current, derived from the North Atlantic Current, which is again derived from the Gulf Stream. Off the S coast of Iceland, the Irminger Current sets N to NW; a part encircles the island in a clockwise direction, and mixes with the East Iceland Current as previously described. The combined flow then sets S to converge with the N sets off the SE coast of Iceland. This convergence often being marked by a sharp discontinuity of sea surface temperature. The mean rates of the currents in this area are also low, probably 0.25 to 0.5 knot; S and SE of Iceland the current is variable in direction, with rates from 0.25 to 1 knot. The East Greenland Current, of which the axis of strongest flow lies just seaward of the 200m contour, and the E set off the N coast of Iceland, may sometimes run at 1 to 2 knots.

South of 80˚N and W of 20˚W

The main current in this area, the East Greenland Current, occupies the NW half of Denmark Strait, and then hugs the SE coast of Greenland. Ice edge movements suggest that a minor branch from the main current sets SE across Denmark Strait to join that part of the Irminger Current which encircles Iceland. The remainder of the Irminger Current, S of about 66˚N turns W across the S approaches to the Denmark Strait, and then turns SW to run alongside the East Greenland Current. The positions of the ice edge S of the Denmark Strait suggest that little mixing occurs between these two currents. Instead, the Irminger Current forms a fairly sharp E boundary to the East Greenland Current and to the drift ice which it bears for most months of the year. Farther S this flow of water forms the NE sector of an elongated counter-clockwise eddy centered off Kap Farvel.

The East Greenland Current and the Irminger Current probably run on average about 0.5 knot, though both currents may attain rates of 1 to 2 knots. Elsewhere, the mean rate is probably less than 0.5 knot.

Tidal Currents in Icelandic Waters

The resultant current round Iceland is the combination of the tidal current and the offshore current.

The tidal currents have an apparently circular movement around Iceland; the current which precedes the tidal wave runs clockwise, and that which follows it runs counter-clockwise. As described later, the current flows clockwise round the entire coast of Iceland, and neutralizes or at least greatly diminishes the opposing tidal current. Thus it is always quicker to navigate around the island in a clockwise direction.

In Icelandic waters, the tidal currents do not run with the regularity to be expected, for example, on the coasts of England, since Iceland lies in the middle of an ocean where storms can influence great masses of water. Furthermore, the island is of considerable size, the mountains frequently form meteorological boundaries, and it may happen that a storm on the S coast coincides with a calm on the N coast; or it may blow very hard out of a fjord while there is a dead calm just outside the entrance. Such circumstances cause irregularity in the behavior of the tidal currents.

On the coast, and in the fjords, the tidal currents turn at about the time of high and low water. At sea, they turn at different times; off Vestmannaeyjar the tidal current turns about 1 hour before high water on the coast; off Faxafloi, at the same time as high water; and then round the island the time of the turn gets

later, increasing gradually to 1, 2, and 3 hours after high water on the coast. As a result, tidal currents on the coast and off the coast may run in the same direction during one part of the tidal cycle, and in opposite directions during another part.

In the coastal areas where tidal current counteracts at a fjord entrance, it forces into the fjord along the upstream side, and runs out along the downstream side.

As usual, the highest rates occur with spring tides, and they are 3 or 4 times stronger than those of neap tides. Off salient points, or where the current is restricted by islands or shoals, the rate may be as much as 5 to 7 knots at springs. As the distance from such places is increased, the rate falls rapidly to 2 to 3 knots. The maximum rate off the open coast, where there are no obstructions, is about 3 knots.

Government

The first settlers came to Iceland from Norway in 874 A.D. Between the years 930 A.D. and 1262, Iceland was an independent republic, but by the "Old Treaty" of 1262, the country recognized the rule of the King of Norway. In 1380, Iceland, together with Norway, came under the rule of the Danish Kings. When Norway was separated from Denmark, in 1814, Iceland remained under the rule of Denmark.

In December 1918, Iceland was acknowledged as a sovereign state, and in June 1944, it was proclaimed an independent republic at Thingvellir, where the Althingi parliament was founded in 930 A.D.

The executive power is exercised by the President through responsible ministers, while the legislative power rests with parliament which assembles at Reykjavik, Iceland's capital, and consists of two Houses. For administrative purposes, Iceland is divided into 16 provinces (syslur), each governed by a chief executive (syslumandhur).

The legal system is based on Danish law.

The capital is Reykjavik.

Holidays

The following holidays are observed:

New Year's Day	January 1
Maundy Thursday	Variable
Good Friday	Variable
Easter Saturday	Variable
Easter Monday	Variable
First Day of Summer	First Thursday in April
International Labor Day	May 1
Ascension Day	Variable
Whit Monday	Variable
Independence Day	June 17
Icelandic Bank Holiday	1st Monday in August
Christmas Eve	Half day on December 24
Christmas Day	December 25
Boxing Day	December 26
New Year's Eve	Half day on December 31

Ice

Ice Distribution

September and October

Over the area covered by this region, sea ice usually reaches its least extent shortly after the end of August. At this time a tongue of ice, carried S in the East Greenland Current, still persists off the Greenland coast as far as 71˚N, though the coast itself is usually almost ice-free from wind effect opening polynya. Therefore, navigation in this area should not be attempted if sea breezes are expected, as the ice, through wind friction, can compact quickly.

The remaining coasts in the area, except for the far NE of Svalbard, are ice-free. In a light ice year, the minimum limit lies considerably farther N; but, it must be remembered that this is a composite minimum limit, and in a light ice year, only parts of the E coast of Greenland N of about 74.5˚N may be expected to be reasonably accessible. In a severe year the maximum limit encloses the E coast of Greenland almost as far as Kap Farvel; it also encloses the N and most of the E coasts of Svalbard. Earlier diagrams show the maximum limit lying farther SE than the maximum limit shown on the ice limit diagram over the area S of 65˚N, and up to 100 miles farther S at 25˚E in Barents Sea.

During October the ice edge advances S in all longitudes, making its greatest advance within the East Greenland Current and in the East Spitsbergen Current. In a severe year almost the whole E coast of Greenland is enclosed by the maximum limit at this time. This maximum limit almost reaches Jan Mayen and, though it is held back N of 79˚N at about 6˚E, it encloses the coasts of Svalbard as it plunges S to Bjornoya. In a light ice year, the E coast of Greenland S of 68˚N, and the whole of Svalbard, are almost ice-free.

November

The greatest advance of the ice edge in all longitudes occurs in November, presumably due to the extensive cooling of the sea surface to its freezing temperature. In the average year, almost the whole E coast of Greenland is enclosed by the ice edge by the end of November; Jan Mayen and much of the coastline of Spitsbergen are also enclosed. A noteworthy feature in the shape of the ice edge at this time is the first indication of a bulge to the NE of Jan Mayen. This bulge, the Jan Mayen Ice Tongue, known as the Jan Mayen Odden, is largely due to the freezing of the cold water in the Jan Mayen Current.

In a severe season, at the end of November, the Denmark Strait is almost closed and the Jan Mayen Ice Tongue extends well E of the Greenwich Meridian. In the Barents Sea, in such a year, the maximum limit lies S of Bjornoya.

December to March

From December to March, the ice edge advances slowly over the greater part of the area. The ice edge usually reaches its greatest extent in February and March. The S limit off East Greenland usually reaches Kap Farvel during January, and at

the end of February lies about 20 miles S of the cape. In Barents Sea the ice edge reaches Bjornoya in December. From November to March the position of the ice edge in the area S of Denmark Strait shows little change; this is largely due to the containing effect of the warm the Irminger Current.

Much of Svalbard is ice-bound by late December and the whole archipelago is enclosed by early January.

Jan Mayen Ice Tongue extends E to reach its greatest extent in February. A noteworthy feature is the development of North Bay, a bight on the N flank of Jan Mayen Ice Tongue. During March, North Bay usually extends SW, presumably due, directly and indirectly to the fact that the NNE winds which have prevailed during the earlier winter months are much stronger in March. By late March the ice edge has advanced to within about 20 miles of the NW tip of Iceland, and lies about 30 miles SE of Jan Mayan.

Ice conditions from December to March show a high degree of variability between a light and a heavy year over the greater part of the area, except for the region SW of Denmark Strait, where the maximum and minimum limits are separated by only 50 to 100 miles; elsewhere they are separated by up to about 300 miles.

In a severe season the ice edge may lie up to 100 miles S of Kap Farvel, up to 80 miles SE of Jan Mayen, and up to 60 miles S of Bjornoya. Though this maximum limit may approach the N coast of Iceland as early as December, it does not effectively close Denmark Strait until March. Jan Mayen Ice Tongue extends E to about 10˚E, at the end of March, in a heavy ice year. Since its development is associated with a prolonged period of W winds, which will simultaneously cause the ice edge S of Spitsbergen to retreat E, the large N-reaching bight in the ice edge centered about 7˚E is unlikely to become cut off. In the W part of Barents Sea, during a severe ice season, the ice edge is located between 73.5˚ and 74.5˚N from December to February.

Though the E coast of Greenland, except for the extreme S, remains ice-bound even in a light season, the ice edge in such a season is located in the NW half of Denmark Strait and well NW from Jan Mayen throughout the period December to March. This minimum lies N of the N coast of Svalbard, as far as 20˚E; the whole of the W coast and much of the S coast are also ice-free. Though this limit lies well N of Bjornoya, it encloses Hopen throughout the period.

April to August

From early April the ice edge gradually retreats N in the average year, reaching its minimum extent in most longitudes in early September. The rate of retreat is greater over Greenland Sea W of about 5˚W and in Barents Sea than it is elsewhere. From April to July the average rate is about 40 miles per month, and in Barents Sea about 60 miles per month; the mean rates are much less in August. There is little movement of the ice edge SW of Denmark Strait from early April to late June; the total retreat in the average season varies between 20 and 60 miles in this period. Over most of the region W of Svalbard and N of 75˚N, the total ice edge retreat is only about 60 miles between early April and early September.

By early August, in the average season, the extent of ice cover over Greenland Sea has been greatly reduced, but a relatively narrow belt of ice still encloses the whole E coast of Greenland S to and beyond Kap Farvel. During August the S portion of this narrow belt usually melts.

Drift ice in Greenland Sea usually clears Jan Mayen late in April; at this time a small part of the NW coast of Spitsbergen is usually almost ice-free, but it is late May before most of the W coast becomes accessible.

By late August, close to the time of minimum extent, the whole of Spitsbergen is usually almost ice-free. By late August the E coast of Greenland is accessible up to about latitude 74˚N, apart from the area S of Kap Brewster. However, because the ice is not far away, fresh E to SE winds can cause it to close rapidly the coast N of Scoresby Sund. Scoresby Sund usually becomes almost ice-free by mid-July and remains so till early October.

Shore leads, sometimes extending hundreds of miles, may open up off the coast of Greenland in almost any month when offshore winds prevail, while winds with an onshore component will rapidly close up these leads, and the momentum of the ice is such that only riding on the ice would prevent destruction.

An interesting feature of the summer break-up pattern is the polynya which usually develops off the NE coast of Greenland. In the average year it first appears in May, during which month the NNE winds of winter are replaced by the NW winds which persist till August.

The polynya usually reaches its greatest size by late June or July, and usually closes up entirely in September.

The foregoing paragraphs describe the summer break-up in the average year, but there are considerable departures from the mean condition in severe and light summer ice seasons, except in the region SW of Denmark Strait, where the variability is much reduced.

In a severe ice season the maximum limit encloses the E coast of Greenland throughout the summer, except for the extreme S from August to October. Denmark Strait may remain closed till late July; the remainder of the N coast of Iceland, and parts of the E coast, may be affected by sea ice till early June. Jan Mayen may remain ice-bound till mid-August and the W coast of Spitsbergen may not become ice-free till late July; Hopen and the E coast of Svalbard may not become accessible till mid-August. The N coast of Spitsbergen, the whole of Nordaustlandet, and the E parts of Barentsoya and Edgeya remain within the maximum limit throughout a severe summer season. In a light season, parts of the E coast of Greenland may become ice-free by late May. By late July the minimum limit lies in about 76˚N off the E coast of Greenland. Though this limit is shown lying N of Bjornoya and NW of Jan Mayen in each month, this should not be interpreted as meaning that both islands have been ice-free throughout a complete year. In fact, at each island large quantities of sea ice have appeared for at least a few weeks each year.

The glaciers on the E coast of Greenland, which collectively produce enormous quantities of icebergs, are carried S in the East Greenland Current, some surviving the journey to round Kap Farvel, while some are carried towards the N and NE coasts of Iceland by the East Iceland Current. The largest numbers will be found close in to the coast of Greenland, the frequency of icebergs decreasing to become few on the E flank of the East Greenland Current, which may perhaps be considered the average limit of icebergs; there is no record of

icebergs having been carried SE or E in the Jan Mayen Current. Some icebergs which have originated from Spitsbergen and Zemlya Frantsa Iosifa are carried SW in the East Spitsbergen Current and the Bear Island Current towards Bjornoya, especially during the period of May to October.

In general, ice limit moves SE from September to April and then retreats till August, except on the SE side of Denmark Strait, where it is held at about 65˚30'N by the Irminger Current throughout the year. During April, when the monthly maximum limit reaches an extreme position, it is located about 400 miles SE of Kap Farvel. There is insufficient data to define limits to the N of the Denmark Strait, but icebergs, sometimes grounded, are not infrequently observed off the N and NE coasts of Iceland

Glacier debris, consisting of growlers and small pieces of land ice, is sometimes carried out of the fjords by the currents in late summer, when the S part of the E coast of Greenland is free of sea ice, in sufficient quantities to hamper the progress along the coast for small vessels.

Ice Limits

Sea ice presents a serious hazard to navigation over much of the area. It should also be borne in mind that small, possibly large, icebergs may be encountered along the Greenland coast at any time. Seasonal variations do not influence iceberg movements, except to trap icebergs in pack ice.

The whole E coast of Greenland is ice-bound for the greater part of the average year, though the coast S of 70˚N is usually almost ice-free in August and September. The coasts of Svalbard and Jan Mayen are usually ice-bound each winter, but the coasts of Iceland remain ice-free throughout the average year, except for the formation of ice in rivers and at the heads of some fjords. In severe seasons, ice reaches the N and E coasts of Iceland, thereby closing Denmark Strait.

The East Greenland Current brings vast quantities of ice and cold water out of the Arctic basin, and accounts for the presence of ice off the E coast of Greenland over the greater part of the year; whereas, the relatively-warm Norwegian Atlantic Current, of Gulf Stream origin, prevents the formation of ice over the greater part of Norwegian Sea and the S portion of Barents Sea. Thus the limits of the sea ice lie much farther S off the E coast of Greenland than elsewhere.

At the time of maximum extent, the S progress of the ice floes, carried by wind and current, is more or less in balance with the degree of melting at the ice edge. Thereafter, as air and sea temperature rise, the ice edge steadily retreats due to the increased rate of melting at progressively higher latitudes, though in many areas wind and current will tend to carry the melting ice floes S.

The ice edge is the demarcation at any given time between the open sea and sea ice of any kind, whether fast or drifting. The severity of the ice season is due, to a very large extent, to the winds. When winds having a major component across the ice edge prevail for a week, or even more effectively for several weeks, the ice edge moves steadily seaward; whereas, when winds blowing off the water onto the ice prevail, the edge retreats towards or even to its minimum position. Any ice floes driven out over these warm currents by winds off the ice usually melt fairly quickly. It should be noted that since the factors which contribute towards heavy or light ice conditions are unlikely to prevail over the whole area at the same time, it is highly improbable that the maximum or minimum conditions will occur over the whole area in any one year.

The width of the transition belt between ice-free conditions and an almost complete cover of sea ice depends on the winds and on the season of the year. Winds off the ice tend to produce a gradual transition, whereas winds blowing onto the ice produce a compact ice edge. Over most of the area the mean wind directions are in most months roughly parallel to the ice edge, so the transition belt is usually only a few miles wide, perhaps less than 10 miles, though in places it may exceed 50 miles. Seasonal melting also affects the width of the transition zone, and in general, it is greatest in July and August, when its width may be several hundred miles.

Ice Reconnaissance

Ice reconnaissance operations are carried out by air in the Frederikshab-Kap Farvel-Tingmiarmiut area. In addition, during the navigable season, ice air-reconnaissance (ISRECCO) is carried out from Mestersvig (72˚12'N., 24˚04'W.) for the benefit of ships bound for the coast between Ammassalik and Danmarkshavn.

Vessels can establish communication with aircraft on ice-reconnaissance or search duty. The Danish Meteorological Institute transmits facsimile transmissions of ice charts for Greenland waters. For details see Pub. 117, Radio Navigational Aids.

Industries

Fish processing is the most important industry within Iceland. The Icelanders depend almost entirely on the sea for their livelihood; they are excellent seamen, and fish for cod on a relatively large scale, especially in Isfafjardhardjup.

Diversification of the economy has resulted in the increase of aluminum ingot, nitrate fertilizer, and diatomite production; in addition, a number of light industries are developing well.

In the past, sulfur and Iceland spar (a transparent calcite) were exported. Beds of coal (lignite) of inferior quality are not uncommon, and iron and kaolin (china clay) have been worked in a small way for local use.

The chief exports are frozen fish, salted fish, fish meal, and fish oil. The chief imports are fuel oil, foodstuffs, motor vehicles, wood, etc.

Languages

The official language is Islenzka (Icelandic).

Magnetic Field

Magnetic Anomalies

Magnetic variation changes sufficiently. For example, during a passage from Bjornoya (74˚27'N., 19˚00'E.) to Scoresby Sund (70˚20'N., 22˚00'W.), a change of about 29˚ had been noted.

Difference of local magnetic anomalies are experienced from time to time in the fjords and off the coast of Iceland, in the vicinity of Jan Maven and Bjrnoya, and in the neighborhood of Spitsbergen.

Reports were received of two cases in which the permanent magnetism of the vessel was temporarily affected as the

disturbance continued. In the first case, the disturbance lasted for some hours; and in the second, it lasted for several days. Strong disturbances were noted in the vicinity of Iceland, in the areas where the depths were as much as 135m.

Maritime Environment

The North Atlantic Ocean washes the S and W coasts of Iceland, and the E coast of Greenland as far N as Kap Nansen. Greenland Sea and Norwegian Sea, divided by a line joining the S end of Spitsbergen, Jan Mayen, and the E extremity of Iceland, lie between the E coast of Greenland, N of Kap Nansen on the W, Spitsbergen on the NE, and Norway on the SE; together they form a basin in the greater part of which the depths are over 1,800m.

This basin is separated from the North Atlantic Ocean by a ridge over which the depths are less than 550m, and on which lie the Faeroes and Iceland. On the E, depths between Norway and Spitsbergen are less than 360m, but to the N, Greenland Sea is connected to the Arctic Ocean by Lena Trough, in which the depths are between 180m and 3,600m. There is also a narrow gully between the Faeroes and Scotland, with depths of over 1,000m.

Vesterisgrunnen (73˚30'N., 9˚10'W.) is a seamount over which the least depth is 123m.

The positions, coastline, hydrography, and topography on some Iceland charts are inaccurate in places; the charts must be used with caution. The heights of lights given on the charts of Iceland coasts, in Pub. 115, Lists of Lights, and in this publication are approximate only. When entering or leaving Icelandic ports, except the port of Reykjavik, larger-scale Icelandic charts should be used.

Denmark Strait separates Iceland from Greenland; the general depths are between 180 and 540m. A depth of 110m was reported almost in the middle of the strait (65˚53'N., 29˚40'W.).

Around the coast of Iceland, sand is the most common material, forming an almost continuous belt around the island. Interspersed over the sand are patches of shell, gravel and mud, with rock occasionally fronting the coast. There would appear to be no general pattern to the distribution of the sediment except that there is a decrease in grain size with the increase in the depth of water. Across the entrances to the fjords, mixtures of sand and gravel are frequently found, but within the fjords mud and silt form the bottom, with little evidence of coarser materials.

The nature of the seabed varies considerably with the depth of water. Along the coast of East Greenland, coarse material deposits alternate with areas of rock stripped bare by grounding ice, and the whole of this coastal belt is bounded by a mixture of mud and sand. In the deep oceanic waters to the S and N of Iceland, ooze or very soft mud is generally widespread, but notable areas of coarser materials occur. In the neighborhood of the mid-oceanic ridge, rock, sand and gravel are found. Similar coarse debris transported by icebergs are found dispersed over the ooze. In the shallow approaches to Barents Sea, the ooze is replaced by mixtures of mud, sand, gravel, and shell.

The surface waters are influenced to a depth of about 300m by two contrasting water masses; warm saline water of Gulf Stream origin, and cold fresh waters from the Polar Basin. The Gulf Stream waters are distributed by the North Atlantic Current system to become widespread to the S of Iceland and along the E sector of the area. The polar waters are transported S by the ice-bearing East Greenland Current and bifurcate to the N of Iceland. At the boundary of the two water masses is the Polar Front, a transition zone where the warm water tends to overlie the denser cold water, resulting in sharp negative temperature/depth and salinity/depth gradients. The values at 1.75 and 1.76 are for the surface or under ice. Variations of salinity and density will be found at the ice edge due to the melting ice.

For an explanation of density as applied to seawater, see Pub. 9, American Practical Navigator (Bowditch). In winter, values of between 1.02750 gm/cm^3 to 1.02775 gm/cm^3 in the E of the area, a value of 1.02725 m/cm^3 in the S of the area, and values between 1.02725 gm/cm^3 and 1.02775 gm/cm^3 in the N are observed. The density decreases towards the E coast of Greenland, with a minimum value of 1.02575 gm/cm^3 in the N. There is an area of more dense water S of Svalbard, with values greater than 1.02800 gm/cm^3. In summer, the values are 1.02675 gm/cm^3 to 1.02700 gm/cm^3 in the E, 1.02675 gm/cm^3 in the S and less than 1.02450 gm/cm^3 in the N of the area. At the Greenland coast the density decreases to less than 1.02500 gm/cm^3.

Regulations

Fishery protection vessels constantly cruise in Icelandic waters.

Offenders against the fishery laws are subject to heavy fines and imprisonment. In Iceland, the eiderduck is protected by law, particulars of which are exhibited at the offices of the Police Superintendents.

Quarantine regulations are strictly enforced and should be understood before a vessel leaves the last port-of-call for Iceland. If a clean bill of health is not obtainable, vessels are quarantined and may request to the port health authority for re-examination.

Vessels bound for Iceland from a foreign port should proceed to one of the following ports for port entry clearance:

Akranes	64˚19'N, 22˚05'W.
Akureyri	65˚45'N, 18˚05'W.
Eskifjordhur	65˚04'N, 14˚00'W.
Hafnarfjordhur	64˚04'N, 22˚00'W.
Husavik	66˚03'N, 17˚21'W.
Isafjordhur	65˚50'N, 22˚28'W.
Keflavik	64˚00'N, 22˚33'W.
Neskaupstadhur	65˚09'N, 13˚41'W.
Patreksfjordhur	65˚36'N, 24˚01'W.
Reykjavik	64˚09'N, 29˚56'W.
Seydhisfjordhur	64˚15'N, 13˚55'W.
Siglufjordhur	66˚09'N, 18˚52'W.

All vessels, after clearing for port entry, may load and/or unload without further permission, and a clearance on departure may also be requested at the following ports:

Blonduos	65˚40'N, 20˚18'W.
Bolungarvik	66˚10'N, 23˚14'W.
Borgarnes	64˚32'N, 21˚56'W.
Djupivogur	64˚40'N, 14˚15'W.

Faskrudhsfjordhur	64˚54'N, 13˚38'W.
Flateyri	66˚03'N, 23˚31'W.
Holmavik	65˚44'N, 21˚41'W.
Hvammstangi	65˚24'N, 20˚57'W.
Olafsfjordhur	66˚05'N, 18˚39'W.
Olafsvik	64˚54'N, 23˚43'W.
Raufarhofn	66˚27'N, 15˚57'W.
Reydharfjordhur	64˚56'N, 13˚41'W.
Saudharkrokur	65˚45'N, 19˚39'W.
Stykkisholmur	65˚05'N, 22˚44'W.
Sudhureyri	65˚37'N, 23˚51'W.
Thingeyri	65˚52'N, 23˚29'W.
Thorlakshofn	63˚51'N, 21˚22'W.
Vopnafjordhur	65˚45'N, 14˚49'W.

Permission must be obtained from the Customs Authorities to land or load at other places.

Routes

Vessels bound for the W coast of Iceland from Europe are advised to steer for Dyrholaey (63˚24'N., 19˚08'W.) or Vestmannaejar, 30 miles W. The practice of keeping a distance from the S coast of Iceland cannot be over-emphasized.

Vessels bound for the E coast should attempt to make a landfall between Gerpir (65˚05'N., 13˚30'W.) and Glettinganes, 25 miles N; there are many prominent landmarks in this coastal stretch, free from off-lying dangers.

Vessels bound for the S fjords along the E coast, can make a landfall in the vicinity of Vestrahorn (64˚16'N., 14˚57'W.) or Eystrahorn, 15 miles NE, but fogs suspend frequently. If fog is encountered anywhere on the E coast, off the S part of Iceland, vessels should keep outside the charted 200m curve, unless the ship's position is certain.

Drift ice may be encountered off the E coast, and if there are strong N winds, drift ice may also be encountered S of 66˚N on the W coast. Due to up-welling, no ice forms on the S or W coasts.

Vessels bound for the N coast of Iceland should avoid rounding Langanes (66˚23'N., 14˚32'W.) without first making a landfall, or until soundings indicate it's safe.

When the fishing and commercial vessels begin to arrive off the E coast during mid-March the coast is occasionally blocked with ice; keep out to seaward to avoid being beset into ice breaking off land; alternatively, head for Berufjordhur (64˚41'N., 14˚15'W.).

If the N coast of Iceland is blocked, the ice will be met at Langanes. Any attempt to sail round it to the N can be devastating, leaving no alternative but to keep to sea or at anchor at Berufjordhur. An attempt to seek a port farther N must be avoided as ice closes the port of Langanes. Subsequently, vessels suffer damage, even those waiting in Vopnafjordhur.

Vessels bound for the midwest coast from the S, should navigate around the S and W coast and make the approach from the W. As the ice drifts E, this course has often been successful, and the advantage is that if the way to Horn is blocked, a secure anchorage can be found in one of the W ports.

Later in the year, when the ice does not form and become a compact mass, entering the ice has been successful near Langanes after a day of difficult navigation. Open waters are found especially on the W coast where ice may leave a narrow channel between it and the shore. However, experience is required for such maneuvers, as entering the ice entails the risk of being crushed, and using a shore lead may result in being driven ashore. With a prospect of S and W winds and spring tides, it appears less risky to go through an open water channel between the shore and the ice, rather than entering the ice, even if it is moderately open.

Jan Mayen

The choice of selecting a preferred route results from examination of the charts and of the surface temperature of Greenland and Norwegian Seas. Sea ice usually affects the island from mid-November to mid-April, but in severe seasons from late October to early August, if not continuously. It is generally best to approach Jan Mayen from the SE.

From the North Sea a course may be shaped N, or a little W of N, so as to keep in temperate waters for as long as possible. When Beerenberg (71˚06'N., 8˚10'W.) bears NW, steer for it.

From Iceland, steer E until out of the East Greenland Current, then turn, keeping in waters of a temperature of over 4˚C.

From the coast of Norway, a direct course may be set without passing N of 71˚N.

Spitsbergen

If a vessel is bound for Bellsund (77˚35'N., 1˚00'E.) or Isfjorden, 30 miles farther N, shape course for the S extremity of Prins Karls Forland, passing about 40 miles W of Bjornoya (74˚27'N., 19˚00'E.).

When vessels are bound for Kongsfjorden, the ice will usually be cleared by passing outside Prins Karls Forland, except from December to May. In early summer the drift ice may be encountered near the latitude of Bjornoya; always alter course W to clear it. Keep W of the ice, a careful lookout from the aloft for ice-blink may save time, as wide and deep bights in the ice leading towards the land often afford no access to it. Bellsund or Isfjorden may be approached from abreast their entrances, but allow for a N current of about 2 knots. If the entrances are obstructed by ice it may be possible, in calm weather, to enter by a lane but great caution is required. A sudden wind may arise, close the lane, and nip the vessel. Many vessels have been beset or have damaged their propellers under these conditions.

Spring trawling begins off the S coast of Iceland; during this time long-line and net fishing takes place off the SW coast.

In autumn the trawlers are found around Horn (66˚25'N., 22˚23'W.), moving in the winter past Langanes to the E coast, and keeping S of the ice. Shark and cod fishing takes place on Spitsbergen Bank (75˚N., 20˚E.).

Spitsbergen Bank, with Bjornoya located near its S end, has depths of less than 200m extending from 30 miles S of the island for 225 miles to the NNE; fishing vessels are engaged on the bank, fishing for cod and shark.

Except in the vicinity of Bjornoya, the bank has not been completely surveyed. At a distance of 50 miles NE and 43 miles N of the island, depths of 22 and 18m have been recorded. Depths of less than 37m lie in the area between and around those two soundings.

Search and Rescue

The National Life Saving Institution (NLSI)

The NLSI of Iceland, founded in 1928, is responsible for all rescue operations, both offshore and inland. Their rescue teams are trained, well equipped, thoroughly conversant with local conditions, and equipped with modern telecommunications, large four-wheel drive vehicles, motor sledges, motor lifeboats, permanently-inflated dinghies, and other suitable rescue equipment.

The following list provides the location of the NLSI rescue teams around the Icelandic coast, with the boats available to each team. All the rescue teams are equipped with line-throwing apparatus.

Location	Boats Available
Akranes	Rigid hull inflatable, 7m; inflatable
Akureyri	
Arskogssandur	Inflatable
Bildudalur	Inflatable
Blonduos	Inflatable
Bolungarvik	Rigid hull inflatable, 8m; inflatables
Borgarfjordhur	Rigid hull inflatable, 6m
Borgarnes	
Breidhdalsvik	Inflatable
Budhir	Rigid hull inflatable, 8m
Faskrudhsfjordhur	
Dalvik	Inflatable
Djupivogur	Inflatable
Drangsnes	Inflatable
Egilsstadhir	
Eskifjordhur	Rigid hull inflatable, 6m; inflatable
Eyrarbakki	Inflatables
Flateyri	Inflatables
Gardhur	Inflatable
Grenivik	Inflatable
Grindavik	Glass reinforced plastic (GRP) boat, 9m
Grundarfjordhur	Inflatables
Hafnarfjordhur	Rigid hull inflatable, 8m; inflatable
Hafnir	
Hellisandur	Aluminum boat, 13m
Hnifsdalur	
Hofn, Hornafjordhur	Steel boat, 15m; inflatable
Hofn, Bakkafjordhur	Inflatable
Hofsos	
Hrisey	Rigid hull inflatable, inflatable
Husavik	Rigid hull inflatable, 6m; inflatables
Hvammstangi	Inflatable
Isafjordhur	Aluminun boat, 13m; inflatables
Kelduhverfi	lnflatable
Kirkjubejarklaustri	
Kjalarnes	Inflatable
Kopasker	
Kopavogur	Rigid hull inflatable, 6m; inflatable
Mosfell	
Neskaupstadhur	Rigid hull inflatable, 6m; inflatable
Olafsfjordhur	Inflatables
Olafsvik	
Patreksfjordhur	Rigid hull inflatable, 8m; inflatables
Raufarhafnarhofdhi	Inflatable
Reydharfjordhur	
Reykjavik	Steel boat, 20m; rigid hull inflatable, 8m
Sandgerdhi	Steel boat, 24m; inflatable
Sandvik, Grimsey	
Saudharkrokur	Rigid hull inflatable, 6m; inflatable
Selfoss	
Seltjarnarnes	Rigid hull inflatable, inflatable
Seydhisfjordhur	Rigid hull inflatable, 6m
Siglufjordhur	Rigid hull inflatable, 6m
Hofdhakaupstadhur	Rigid hull inflatable, 6m; inflatable
Stodhvarfjordhur	Inflatable
Stokkseyri	Inflatables
Stykkisho1mur	Rigid hull inflatable, 6m; inflatable
Sudhavik	
Sudhureyri	
Svalbardhseyri	
Talknafjordhur	Inflatables
Thingeyri	Rigid hull inflatable, 6m; inflatable
Thorlakshofn	Rigid hull inflatable, 8m; inflatable
Thorshofn	Inflatable
Vogar	Inflatable
Vopnafjordhur	Inflatable

Coastal refuge huts, now erected and maintained by the NLSI, first came into practice after a German trawler stranded on Skeidhararsan during January 1903; the crew got safely ashore, only to suffer great privations, from which three men died before finally reaching a farm house after 11 days. As a

result, the German Consul at Reykjavik, at his own expense, caused a hut to be built and provisioned at Kalfafellsmelar. This facilitated to a second German trawler that stranded, and the crew were rescued by the local farmers.

Since the foundation of the NLSI, many more shelters have been built, first on the S coast, and later in Vestfirdhir and on the N coast. Shelters are not designed to meet any particular type of structure. On the sands of the S coast they are built on stilts, approximately 1m above ground level, so as to allow sand to be blown under them instead of piling up against their sides.

Shelters on the N sides of Vestfirdhir are similarly raised, to prevent them from being snowed under.

All shelters are identifiable by the NLSI sign, and are painted in international orange color. They are stocked with all the necessary survival equipment such as warm clothing, food, first aid kit, heating apparatus, lights, and useful information. Radiotelephones (RT), installed in many shelters, receive and transmit on the 2182 kHz emergency frequency, at 20 watts, powered by 8 six-volt dry batteries. In addition, some sets have a manually-operated generator.

The following table gives the location of the coastal refuge huts around the Icelandic coast. All the huts are equipped with a VHF radio, unless stated otherwise.

Location	Position	Remarks
Almenningsnof	66˚08.9'N,19˚03.2'W	Telephone only
Alvidhruhamrar	63˚26.3'N,18˚27.1'W	
Austurfjorutangi	64˚14.3'N,15˚10.0'W	Telephone only
Bardhsvik	66˚20.1'N,22˚13.9'W	
Brunavik	65˚32.0'N,13˚42.0'W	No radio equipment
Dritvik	64˚45.8'N,23˚55.0'W	No radio equipment
Faxasker	63˚27.7'N,20˚14.4'W	No radio equipment
Fjallaskagi	66˚00.5'N,23˚48.0'W	
Flatey	66˚09.6'N,17˚50.8'W	
Fl otavik	66˚26.8'N,22˚55.6'W	
Fossfjara	63˚44.2'N,17˚36.5'W	
Furufjordhur	66˚16.5'N,22˚13.9'W	
Glettinganes	65˚31.0'N,13˚37.0'W	No radio equipment
Hedhinsfjordhur	66˚07.8'N,18˚47.4'W	Citizens band radio only
Hjorleifshofdhi	63˚25.1'N,18˚46.1'W	No radio equipment
Hlodhuvik	66˚25.3'N,22˚38.8'W	
Hornvik	66˚25.3'N,22˚29.5'W	
Hrafnsfjordhur	66˚16.0'N,22˚21.8'W	
Hvalsneskridhur	64˚27.6'N,14˚30.7'W	No radio equipment
Hvanndalir	66˚09.3'N,18˚39.8'W	No radio equipment
Ingolfshofdhi	63˚48.2'N,16˚38.4'W	No radio equipment
Keflavik, Briedhafjordhur	65˚30.5'N,24˚14.5'W	
Keflavik, Gjogurta	66˚10.0'N,18˚15.0'W	
Kopanes	65˚47.7'N,24˚06.5'W	No radio equipment
Krossadalur	67˚42.0'N,24˚03.5'W	No radio equipment
Lageymanareyjar	66˚17.8'N,17˚07.2'W	No radio equipment
Latrar	66˚07.0'N,18˚19.0'W	
Latravik, Adhalvik	66˚24.0'N,23˚01.0'W	
Manes	65˚32.0'N,22˚25.0'W	No radio equipment
Myrnatangi	63˚27.1'N,18˚19.8'W	
Naustavik	66˚01.0'N,17˚40.0'W	No radio equipment
Nyios	63˚45.2'N,17˚30.0'W	
Sandeyri	66˚09.0'N,22˚50.8'W	
Sandvik, Gerpir	65˚05.4'N,13˚33.1'W	
Saebol, Adhalvik	66˚20.5'N,23˚05.5'W	
Seley	64˚59.0'N,13˚31.0'W	
Skaftaros	63˚39.0'N,17˚49.6'W	
Skalar	66˚19.8'N,14˚46.2'W	
Skalavik	66˚11.0'N,23˚28.0'W	
Skeidhararsandur	63˚46.6'N,17˚15.1'W	
Sletta Ytri Hafnir	66˚17.8'N,22˚59.2'W	
Stigi	66˚11.5'N,23˚24.0'W	
Surtsey	63˚18.2'N,20˚35.6'W	No radio equipment
Svalvogaviti	65˚54.5'N,23˚51.0'W	
Thorgeirsfjordur	66˚09.1'N,18˚07.5'W	

Tides

The tides are mainly semi-diurnal. In Iceland, the time of the tide progresses clockwise round the island. The ranges vary between 3 to 4m at the W end and about 1.5m at the E end.

At Jan Mayen and Bjornoya, the range is about 1.1m, and in Svalbard it varies between l and 1.5m. On the E coast of Greenland, the time of the tide gets progressively later to the N

and the range decreases from about 2.5m at Kap Farvel to about 1m at Danmarkshavn.

Farther N, little is known about the tides, but at Kap Morris Jesup the range is about 0.2m.

Time Zone

Iceland maintains ZULU (UTC). Daylight Savings Time is not observed.

World Time Zone Chart
http://www.odci.gov/cia/publications/factbook/ref/pdf/802801.pdf

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